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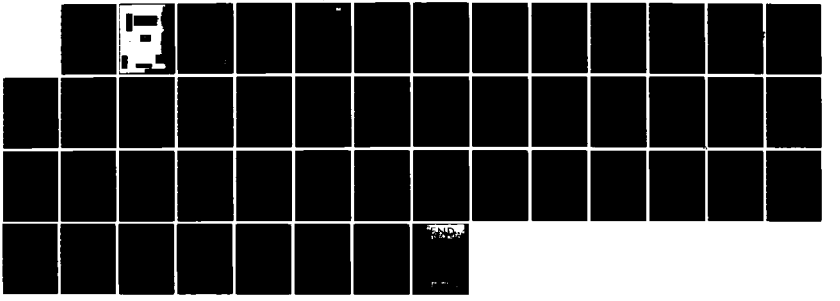

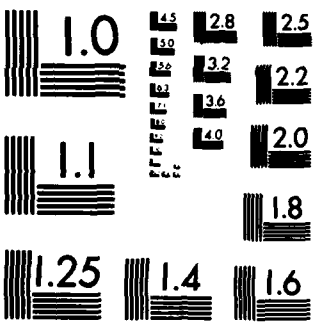
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LIFE CYCLE COST MANAGEMENT MASTER PLAN FOR THE DEFENSE COMMUNICATIONS AGENCY

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April 1984

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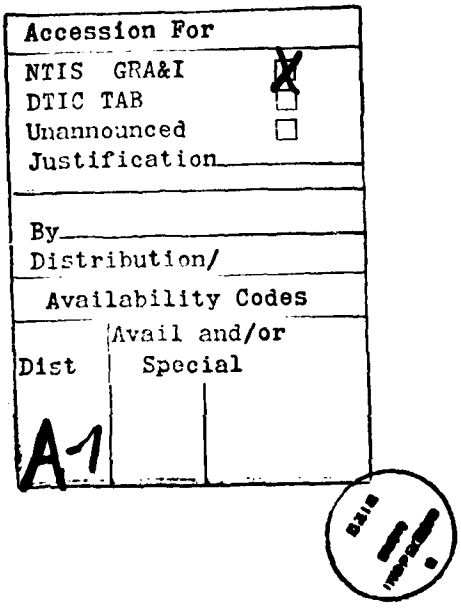

Executive Summary

LIFE CYCLE COST MANAGEMENT MASTER PLAN FOR THE DEFENSE COMMUNICATIONS AGENCY

The Defense Communications Agency (DCA) has evolved from functioning simply as primary manager and operator of the Defense Communications System to providing command, control, and communications (C^3) mission analysis, long-term planning, and systems engineering and integration support to the National Command Authority and to the Office of the Secretary of Defense, Joint Chiefs of Staff, and Unified and Specified Commands. The reorganization of DCA in 1981 was a major step in consolidating mission and mission-support resources to accommodate this enhanced role.

The demands of this new role, along with developments in Department of Defense acquisition policy, require improved DCA life cycle cost (LCC) estimating and analysis capabilities in the areas of:

- Advanced-system cost estimating
- Independent cost estimating and LCC quality assurance
- Comparative economic analysis
- Accurate estimating of funding requirements as part of the planning, programming, and budgeting process
- Assessing cost implications of acquisition management alternatives
- Program cost tracking
- Special studies and analyses.

We were asked to prepare a master plan for developing these capabilities.

Our plan calls for conducting pilot projects and development programs. Pilot projects covering LCC for long-term planning, for program definition and

mid-term planning, for acquisition program management, and for agencywide management would be undertaken. These projects would result in assessing the usefulness of current DCA, Military Service, and commercial LCC models and data bases. Development programs would be defined and executed for adapting those models and data bases found useful and developing new ones if they are needed.

Implementing the proposed master plan would result in LCC capability improvements for communications systems in Fiscal Year 1987 and for command centers and automatic data processing shortly thereafter. Near-term capability improvements would be made to meet the LCC requirements of such priority DCA programs as the Defense Switched Network, the Minimum Essential Emergency Communications Network, and the Nuclear Weapons Employment and Acquisition Master Plan, as part of DCA's commitment to implementing the acquisition planning process. In the long term, LCC capabilities responsive to the rapid technological advances in C^3 systems would be fully automated and available throughout DCA.

The projected cost for developing the LCC capabilities set forth in the master plan is about $1.5 million per year. This cost is modest in relation to the cost of C^3 systems and to the benefits to be realized from the results: selection of cost-effective systems and system-support options, improved cost control, and affordable C^3 systems.

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1. INTRODUCTION

The master plan for managing the development of life cycle cost (LCC) estimating and analysis capabilities in the Defense Communications Agency (DCA) is oriented to address these goals:

- Integrate DCA's efforts in a cohesive capability ensuring that DCA programs and products complement each other to achieve DCA's goals effectively.
- Develop command, control, and communications (C^3) plans and programs that are accurate, well structured, prioritized, and timely enough to influence the Defense Guidance and serve as a working document for all concerned.
- Improve overall DCA management effectiveness significantly.
- Enhance the management of integrated logistics support throughout the life cycle of DCA-managed systems in order to better support the users as the systems are fielded.

Development of LCC estimating and analysis capabilities will improve DCA's capability to provide LCC inputs to the planning, programming, and budgeting system (PPBS), the system acquisition process, and the analysis of supportability of C^3 systems. The master plan for making the transition from current DCA LCC capabilities is consistent with the DCA acquisition planning initiative described in the Background section of this chapter. Implementation of the master plan in conjunction with promulgation of a DCA policy on LCC and improved management processes should result in significant benefit to DCA.

STRUCTURE OF THE LCC MANAGEMENT MASTER PLAN

The objective of the LCC management master plan is to guide the development of the LCC capability in DCA. The current LCC analysis capabilities in DCA are described and evaluated in Chapter 2. Chapter 3 sets forth a strategy and guidelines for making the transition from the current capability to an efficient, automated LCC analysis capability readily accessible to the DCA

user community. A preliminary transition plan for developing the required capabilities is outlined in Chapter 4.[1]

The development of the LCC capability described here should benefit the DCA by:

- Providing more cost-effective systems that will result in lower rates to users of DCA systems and improve long-term plans and program plans for DCA- and Service-managed systems
- Improving the abilities of DCA senior management and program managers (PMs) to detect problems and take timely corrective action
- Improving LCC information needed to facilitate justification of plans, programs, and budgets by architects, PMs, and system engineers (SEs)
- Reducing or eliminating challenges to DCA programs from outside the agency [Congress, Office of the Secretary of Defense (OSD), Joint Chiefs of Staff (JCS), and the Military Departments]
- Integrating DCA efforts; the LCC of C^3 operational objectives and C^3 element capability objectives will be traceable from architecture through program definition and from system acquisition to subsequent operating and support
- Providing cost savings from the elimination of duplicate effort
- Placing DCA at the forefront of development of cost and management analysis processes in the C^3 area.

BACKGROUND

Cost analysis in DCA is currently accomplished using a combination of contract and in-house resources. The results only partially or minimally satisfy the cost information needs of architects, PMs, SEs, corporate management, and the agencywide integration staff. These DCA users need to have

[1] LCC capabilities objectives, LCC information requirements specified in Department of Defense Directive (DoDD) 5000.2, preliminary LCC model functional descriptions, and a Congressional requirement concerning independent cost estimates are presented in Logistics Management Institute Working Note DC301-3, "Life-Cycle Cost Master Plan (Draft) for the Defense Communications Agency," December 1983. Note that LCCs are to be considered in planning for acquisitions for which contractual costs for (1) development exceed $2M or (2) production or service exceed $5M in any fiscal year or $15M overall. [Department of Defense (DoD) Supplement to the Federal Acquisition Regulation (FAR), to be published April, 1984.]

high-quality cost estimates and analyses to (1) perform cost-benefit studies and affordability assessments, (2) make the system acquisition and supportability inputs required to support planning, programming, and budgeting, and (3) control costs and manage DCA programs.

DCA's Current LCC Capability: A Brief Assessment

Review of the cost information used in several DCA planning documents has revealed (1) an inconsistency in the treatment of costs particularly in areas of operating and support and LCC, which in some documents are not treated at all, (2) a duplication of effort resulting from the lack of a generally available program cost data base, and (3) gaps in LCC data when no Service cost estimate is available and no DCA cost estimating capability exists. Occasionally, different teams of architects and SEs develop cost estimates on the same systems and programs without making the cost information available to each other and to agency management and integration personnel. Affordability assessments are only performed infrequently, and no standard analytical process has been prescribed for conducting affordability analyses. No capability exists for estimating LCC for systems in the early stages of concept formulation, particularly for system concepts originated by DCA architects. A formalized cost and schedule control system suitable for DCA-operated programs also has not yet been developed.

The current approach to LCC estimating and analysis in DCA, which is described in Chapter 2, has resulted not only in duplication of effort but also in the use of nonstandard analytical procedures; inadequate consideration of economic evaluation of design and support alternatives; inadequate -- or a complete absence of -- consideration of affordability of systems, programs, and plans; and lack of a system for tracking program cost growth to achieve better cost control.

These deficiencies have contributed directly to missed schedules, insufficient funding, and even program cancellation in such DCA-managed programs as AUTODIN II and AUTOSEVOCOM. Unrealistic initial program assumptions and cost estimates for the Ground Wave Emergency Network (GWEN), a DCA-initiated but Service-managed program, may require a reduction in scope of that project that could translate into reduced performance.

Some of the frustrations caused by deficiencies in LCC estimating capabilities were articulated in a recent architectural planning document, "Nuclear Weapons Employment and Acquisition Master Plan (NWEAMP) (U)," Phase II, C^3 Architectural Panel, Final Report, June 1983, TOP SECRET:

> (U) The problem faced by the C^3 Working Group, in our effort to obtain meaningful cost estimates, appears to be symptomatic of a significant gap in DoD capability. We were unable to identify any individual, group or organization, within OSD, the Defense Agencies, Office of the Joint Chiefs of Staff or the Services, with the responsibility for estimating the costs of conceptual C^3 systems. Time and time again we were told that, 'If it isn't covered in the FYDP [five-year defense program], no one knows how much it will cost, and no one is authorized to estimate its cost.'
>
> (U) This strange state of affairs forced the C^3 Working Group to put together an ad hoc cost estimation team, which drew upon FYDP cost figures, data in previous reports, and engineering judgment (based primarily on cost data for previously fielded, analogous systems) to prepare our cost estimates. Since the cost estimation problems we faced appear to be pervasive, and likely to arise in any long-term planning effort, we recommend that a focal point be designated (perhaps in DCA), with the responsibility and expertise to provide cost estimates for future strategic C^3 systems, while these systems are still in the concept development stage.

The recommendation made in the NWEAMP Executive Summary is as follows:

> (U) It is extremely difficult to develop cost data on future C^3 systems. Some agency (perhaps DCA) should be tasked to maintain a data base and develop a methodology for costing new C^3 systems while they are in the early conceptual stage.

When programs involve a substantial commitment of funds, a second estimate, independent of the PM's estimate, may be required. Aware of the cost estimating problem and the importance of independent cost estimates, Congress has required the Secretary of Defense to submit a report by May 1, 1984, on the use of independent cost estimates in the planning, programming, budgeting, and selection process for major acquisition programs in the DoD.

In addition, LCC analysis capabilities need further development because DCA is undertaking a major initiative to achieve better agencywide integration through the evolution of a refined mission-oriented acquisition planning process. LCC management can be an effective process for achieving integration across all DCA missions.[2]

Acquisition Planning in DCA and the DCA LCC Initiative

The basic DCA mission-oriented acquisition planning process as it has evolved to date is shown in Figure 1-1.[3] The process emphasizes DCA's primary role in the initial stage of acquisition planning -- mission analysis -- that will lead to initiating specific system acquisition programs that are affordable. Long-term architecture produces a transition strategy to evolve the C^3 architecture.

Architecture represents a description of C^3 capabilities, characteristics, and generic systems that, together, satisfy a set of mission-associated requirements; it also specifies a set of future objectives (typically 10 to 20 years ahead). There are two kinds of architectures: mission and functional. Mission architectures state broad concepts and

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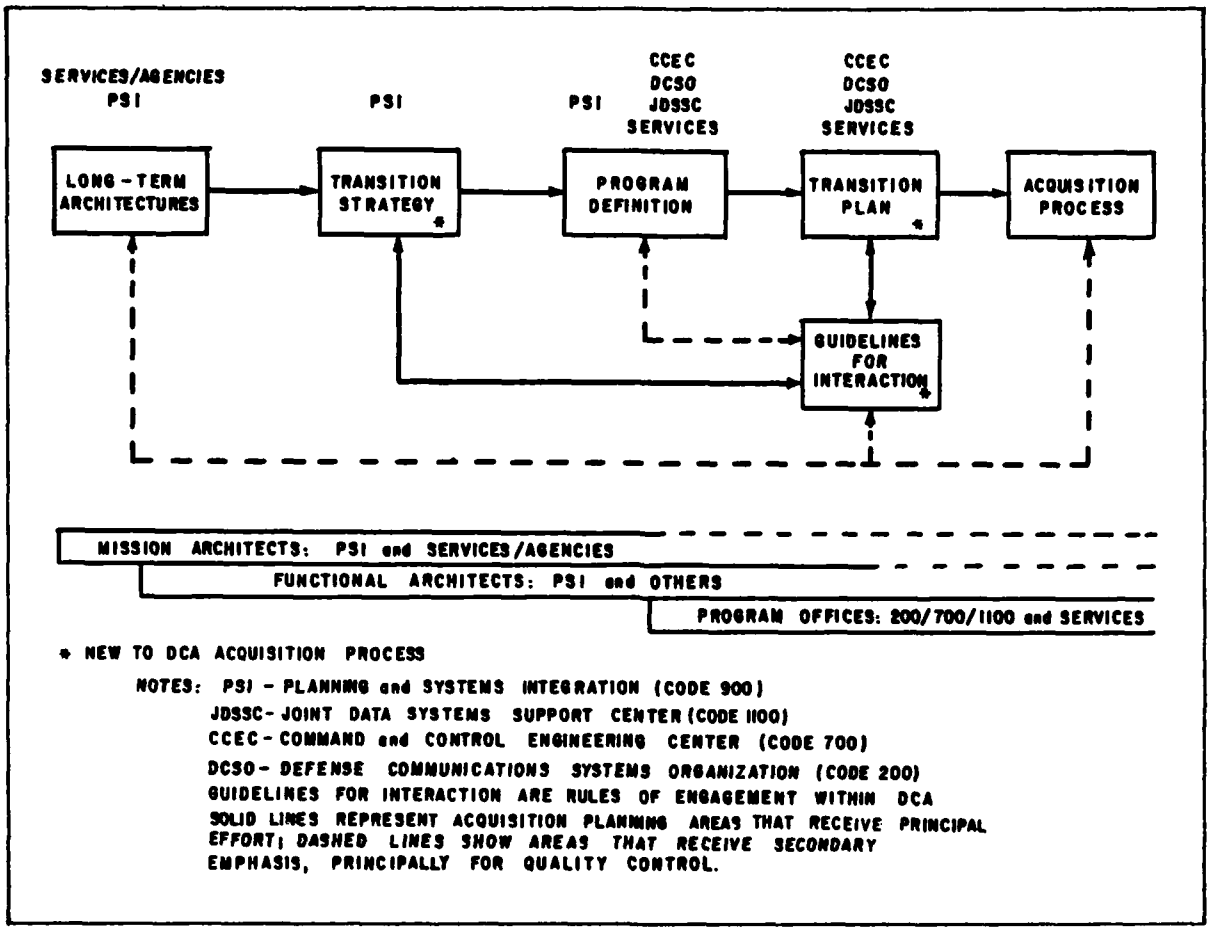
[2]See DoDD 5105.19, "Defense Communications Agency and the DCA Director's Planning Guidance," October 1983.

[3]"Acquisition Planning at the Defense Communications Agency," Fred L. Adler, et al., Logistics Management Institute Report DC301-A, February 1984, and "Mission-Oriented Acquisition Planning at the Defense Communications Agency," Logistics Management Institute Working Note DC301-2, December 1983.

FIGURE 1-1. DCA ACQUISITION PLANNING PROCESS



policies, establish references for functional architectures, respond to projected threats, specify functions to be performed and their desired performance characteristics, and identify capability objectives. Functional architectures describe the technical structure of large-scale systems or programs, define preferred methods or techniques that might be used to satisfy requisite performance objectives, provide feedback to mission architectures, develop transition strategies, and refine capability objectives. Three mission architectures (strategic, tactical/theater, Defense-wide) and five functional architectures corresponding to C^3 elements [communications, command centers,

automatic data processing (ADP), intelligence, and sensors] are evolving under mission and functional architects, respectively. The transition strategy, including the long-term plan, is prepared as an architectural product, primarily by the functional architect, to coordinate with the program definition community, i.e., all affected SEs and PMs.

Program definition in DCA is primarily a system engineering function oriented to system acquisition program management. It is used to guide system acquisition and operational programs, which are generally executed by the Services. Program definition in DCA is conducted by systems engineers in the DCSO, the JDSSC, and the CCEC. The program definition function is performed to translate the transition strategy into a transition plan showing how the program should evolve.

DCA is primarily concerned with macrofunding implications of architectures and programs and with maintaining oversight of specific Service acquisition programs at the system acquisition level. As part of a new start, funding implications must be discussed, per Department of Defense Instruction (DoDI) 5000.2,[4] as follows:

> Discuss affordability, including the level of funding the Component is willing to commit to satisfy the need. When a concept has been selected, provide gross estimates of total research, development, test, and engineering (RDT&E) cost, total procurement cost, unit cost, and life cycle cost.

At the architecture and program level, the concern is whether the accumulation of LCCs of the various systems within the architecture or program exceeds the allocated funding level within the mission or functional architecture in all appropriation categories. Affordability must be determined at the architecture level as well as at the Agency level.

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[4]Department of Defense Instruction 5000.2, "Major Acquisition System Procedures," 8 March 1983.

Architects need cost information to perform economic evaluations of alternative design and support concepts and to assess the affordability of proposed architectures. These processes require that architects be able to estimate or access Service estimates of research and development, investment, and operating and support costs for current and proposed C^3 systems. System engineers need cost information during program definition to conduct tradeoffs among program alternatives to provide transition plan direction.

DCA is also responsible for the acquisition, continued improvement, and operation of the DCS and other C^3 systems. In this capacity, DCA PMs have the same management responsibilities as Military Department PMs in the acquisition, operations, and support of DCA-managed programs. As such, DCA PMs[5] require the same LCC estimating capabilities, data bases, and subroutines/modules for addressing numerous decision analytic processes.

Senior DCA management also needs cost information to control DCA-operated programs and PMs and for planning internal activities and achieving agencywide integration of life cycle management.

Acquisition planning in DCA is conducted within a framework established by DCA and is consistent with tasking from the JCS to develop a Command and Control Five-Year Summary Plan (C^2FYSP). As part of this effort, an annual assessment of C^3 capabilities is undertaken. The five-year cost of the C^3 program is also considered.

The mission structure is thus further defined by the C^2FYSP, which describes mission planning in terms of strategic C^3; tactical/theater C^3; Defense-wide C^3 missions under increasing stress levels from peacetime through

[5]The specific definition of the role of LCC in system acquisition is provided in "The Framework for Life Cycle Cost Management," Richard P. White, Logistics Management Institute, January 1982.

protracted nuclear war; and C^3 element capability objectives for communications, command centers, ADP, intelligence, and sensors.

It was against this background that DCA decided to evaluate its LCC analysis capability and to develop this master plan for development of an LCC capability. The master plan contains an evaluation of DCA needs for cost information, an assessment of current capabilities, and a plan for the development of enhanced capabilities.

2. CURRENT DEFENSE COMMUNICATIONS AGENCY LIFE CYCLE COST ANALYSIS CAPABILITIES

Both in-house DCA and contract resources are used to perform LCC analyses. The current DCA in-house LCC analytic capabilities are centered in the Cost and Economic Analysis Division (CEAD), Code H690, of the Comptroller's Office. The CEAD generally provides cost analysis services to corporate management and agencywide integrators. In addition, the user groups -- the architects, SEs, and PMs -- also have LCC analysis capabilities; these user groups, however, generally contract for cost analysis services. Some DCA user groups rely almost entirely on contractors to furnish the LCC information required. Historically, DCA corporate management has devoted only limited attention to the LCC area, and no agencywide integration of LCC information exists.

COMPTROLLER'S COST AND ECONOMIC ANALYSIS DIVISION

The CEAD serves DCA by developing cost and economic analysis[1] policy and cost methodology; publishing a Cost and Planning Factors Manual;[2] developing computerized models; reviewing economic analyses and cost estimates; performing, advising, and assisting in cost and economic analyses; reviewing cost comparisons required by Office of Management and Budget (OMB) Circular No. A-76; and providing training services to the DCA staff. The CEAD has six staff members, including a division chief, a secretary, and four analysts and in addition, contracts for one or two professional staff years of support annually.

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[1]DCA Instruction 600-60-1, "Economic Analysis and Program Evaluation for Resource Management," 3 January 1984.

[2]DCA Circular 600-60-1, "Defense Communications Agency Cost and Planning Factors Manual," March 1983.

The CEAD is the only group in DCA that specializes in the cost and economic analysis function. As such, it has training and experience in the policies, practices, and procedures followed by the DoD cost analysis community and also keeps abreast of the state of the art in C^3 cost analysis. The CEAD disseminates much of this information to other DCA users by means of DCA's Cost and Planning Factors Manual.

The Cost and Planning Factors Manual ". . . provides a guide for personnel who prepare and review cost estimates and economic analyses of DCA-managed systems, programs, and projects. It presents DCA cost data, planning factors, estimating procedures, methods, and formats related to communications, system planning, programming, budgeting, and program evaluation."[3]

USER GROUPS

DCA's architects, SEs, and PMs satisfy most of their needs for cost information by using their own budget resources, typically relying on contractor support. The user groups, supported by contractors, estimate advanced system costs, develop program cost data bases, and sometimes perform affordability assessments as well as economic evaluations and long-term planning. Occasionally, the user groups request assistance from the CEAD or use the DCA Cost and Planning Factors Manual to obtain specific information. The more typical approach, however, is to contract for a specific product such as a concept formulation study containing LCC estimates or a program data base to be used as input to a specific planning document (e.g., NWEAMP or C^2FYSP).

While professional cost analysis services may be acquired quickly from the most competent contractors, this approach inevitably leads to some duplication of effort as the various architects, SEs, PMs, and agencywide

[3]Ibid.

integrator/corporate manager user groups select different contractors to provide support. Data bases, methods, and models acquired under contract are typically not assimilated into a corporate memory for future application. To be effective, the use of contract support requires a substantial monitoring and integrating effort by the DCA staff trained in cost analysis, which is generally not available in the offices of architects, SEs, and PMs that contract for services.

DCA PMs have had to respond to defined requirements for cost information on programs acquired and operated by DCA. However, DCA does not emphasize LCC management. For example, no LCC estimate has been developed for the approved Defense Data Network (DDN), a sizable system acquisition. SEs in DCA develop program cost data bases for inclusion in planning documents such as the Minimum Essential Emergency Communications Network (MEECN) Master Plan, and occasionally they contract for program definition studies and cost estimates. Such was the case in a study of alternatives for the GWEN. Problems were encountered in this evaluation when the responsibility for implementation of the preferred GWEN alternative was handed over to the Air Force. The Air Force estimate of costs was twice that in the original evaluation, largely because of different programmatic assumptions. Because of this disparity, the scope of this program may have to be limited to meet Air Force affordability criteria.

Architects in DCA have occasionally performed economic analyses and affordability assessments. The NWEAMP contains five-year program data and LCC information for strategic C^3 systems. In a long-range architectural study conducted at the Defense Communications Engineering Center (DCEC), a model was developed to provide forecasts of funding requirements associated with DCS alternatives. However, these long-range planning studies are ad hoc efforts

and are not conducted on a regular basis as part of a defined DCA management process to incorporate LCC principles. Furthermore, no provision is made for a quality assurance review of the cost information contained in any of the above studies by the CEAD.

ASSESSMENT OF CURRENT CAPABILITIES

We have identified several deficiencies in DCA's current approach to developing the LCC information needed to manage C^3 programs. These deficiencies are the result of one or a combination of factors that include inadequate funding for the development of LCC capabilities, failure to consider LCC in well-defined management processes (e.g., program review), and the use of cost estimators who are not trained in cost work. The areas in which deficiencies were identified and the deficiencies are as follows:

Use of LCC Data by Corporate Management

- Alternative architectures, systems, and programs are not carefully evaluated.
- Some program evaluations are incomplete or inaccurate.
- Baseline estimates of LCC for DCA programs are not required in DCA program reviews.
- Independent estimates of LCC are not required for DCA programs, and the capability to provide such estimates has not been developed.
- Tracking of program cost changes in program reviews with emphasis on likely future costs and programmatic impacts is not done.

Adequacy of LCC Processes

- In all but a few cases, DCA does not have the resources to independently review cost inputs to the DCS Five-Year Program (FYP), NWEAMP, C^2FYSP, MEECN Master Plan, contractor-performed cost-benefit studies, and other DCA documentation.
- DCA is not currently able to estimate costs for new technologies.
- The Cost and Planning Factors Manual contains out-of-date information.
- DCA cost model development efforts have been terminated because of lack of funding.

- Inefficient, manual methods are used for costing exercises because of the lack of a development effort to take advantage of computerized methods.

- The CEAD includes cost factors for communications and some ADP systems in the Cost and Planning Factors Manual; no DCA cost information source exists for command centers, intelligence systems, and sensors. Such a source should be developed, perhaps within the Cost and Planning Factors Manual, and should also include all command, control, and communications/intelligence (C^3/I) systems for which DCA architects, SEs, and PMs have design or management responsibilities.

Availability of Qualified LCC Resources

- Except in the CEAD, DCA cost estimating personnel are generally not trained in cost analysis and, as a result, quality assurance review of cost analysis work done under contract has been inadequate.

Use of LCC in Technical Decision-Making (Architecture, Program Definition, System Acquisition)

- Cost estimates, data bases, and models developed under separate contract study efforts sponsored by architects, SEs, and PMs are not made generally available throughout the agency, resulting in duplication of effort.

- Program data bases developed by DCA architects and SEs are incomplete and not updated with each update in the FYDP to reflect decisions made in the program/budget cycle.

- Affordability assessments are not always done and incorporated into the planning documents.

Some of these deficiencies have resulted in DCA programs being challenged by other Government agencies. The development of LCC data bases, models, and analytical processes, along with enhancements to the planning and management process, will enable DCA to better justify its program proposals. Furthermore, because the planning process will be mission-oriented, DCA will have a greater influence on the design of C^3 systems than heretofore.

The essential ingredients of an LCC analysis capability are data bases, methods and models, and applications analysis capabilities. Table 2-1 presents a summary assessment of DCA's current capabilities in each of five functional areas. Areas in which little or no current capability exists or

TABLE 2-1. ASSESSMENT OF CURRENT CAPABILITIES

LCC CAPABILITY ELEMENTS	USER GROUP RELEVANCE					FUNCTIONAL AREAS			
	ARCHITECTS (MISSION / FUNCTION)	SYSTEM ENGINEERS (PROGRAM DEFINITION)	PROGRAM MANAGERS (SYSTEM ACQUISITION)	CORPORATE MANAGEMENT / AGENCYWIDE INTEGRATORS	COMMUNICATIONS	AUTOMATIC DATA PROCESSING	INTELLIGENCE	SENSORS	COMMAND CENTERS
DATA BASES									
HISTORICAL COSTS	X	X		X	R	R	R	R	R
CURRENT SYSTEMS COSTS	X	X	X	X	Y	R	R	R	R
FUTURE SYSTEM COST ESTIMATES	X	X		X	Y	Y	R	R	R
PROGRAM COST DATA BASES	X	X		X	Y	Y	Y	Y	Y
COST FACTORS	X	X	X	X	Y	Y	R	R	R
METHODS AND MODELS									
LCC ESTIMATOR AND AGGREGATOR	X	X	X	X	Y	R	R	R	R
DISCOUNTED LCC CALCULATOR	X	X	X		R	R	R	R	R
FUNDING REQUIREMENTS FORECASTER	X	X			Y	Y	Y	Y	Y
PARAMETRIC COST-ESTIMATING RELATIONSHIPS	X			X	Y	R	R	R	R
LOGISTICS SUPPORT ALTERNATIVE ANALYZER		X	X		R	R	R	R	R
APPLICATIONS									
PROGRAM REVIEWS				X	R	R	R	R	R
ECONOMIC ANALYSES	X	X	X	X	Y	Y	R	R	R
PLANNING	X	X			Y	Y	Y	Y	Y
AFFORDABILITY ASSESSMENTS	X	X	X	X	R	R	R	R	R
ACQUISITION MANAGEMENT ANALYSES			X		Y	Y	Y	Y	Y

R = RED: LITTLE OR NO CURRENT CAPABILITY.
Y = YELLOW: SOME CURRENT CAPABILITY NEEDING IMPROVEMENT.
G = GREEN: SUBSTANTIAL CURRRENT CAPABILITY.
X = REQUIREMENT

those in which no developed management process exists are coded red to indicate a need for original work. [DCA generally color-codes its assessments.] Areas with partial capability needing improvement are coded yellow. Green, although not used in Table 2-1 at this time, is reserved for areas of substantial capabilities that may be developed in the future.

All functional areas included in Table 2-1 need improvement, and some need original work. The deficiencies in capability to do applications analyses are sometimes the result of the absence of a well-defined management process. For example, since LCC is not currently emphasized in program reviews, baseline cost estimating, program cost tracking, and independent cost estimating are not done. Table 2-1, which indicates the user group relevance of each capability, shows that several users require the same capabilities. This common requirement provides an argument for having a centralized LCC capability as compared with undertaking separate contract efforts that usually result in at least some duplication of effort.

Table 2-2 is a summary-level comparison of LCC capability objectives with DCA's current capabilities, by user group. Major shortfalls are discussed in the following subsections.

Mission Architects

LCC data for strategic C^3 systems are contained in the NWEAMP architecture document. An LCC estimating capability for advanced C^3 systems needs to be developed. Additional capabilities are needed to support Defense-wide and tactical/theater C^3 mission architectural planning efforts to include the extension of affordability analyses in these areas.

Functional Architects

The Cost and Planning Factors Manual contains cost factors, models, procedures, and policies for some current communications and ADP equipment,

TABLE 2-2. LCC CAPABILITIES IN DCA

USER GROUPS	LCC CAPABILITY OBJECTIVE	CURRENT LCC CAPABILITY
Mission Architects	- LCC for strategic, tactical/theater, and Defense-wide C^3 at all stress levels	- Strategic LCC (partly)
	- Affordability of C^3 operational objective within mission area	- Strategic mission (NWEAMP) limited
Functional Architects	- LCC for communications, ADP, command center, intelligence, and sensor elements	- Communications LCC existing per C&PF Manual; limited ADP; command center, intelligence, and sensors are not covered
	- Affordability of C^3 element capability objective within functional area	- Not determined explicitly
System Engineers (Program Definition)	- LCC for program definition	- None readily available in-house
	- Affordability of program alternative(s)	- Not determined explicitly
Program Managers (System Acquisition)	- LCC for C^3 system acquisition	- None readily available in-house
	- Affordability of tailored acquisition strategies	- Not determined explicitly
Corporate Management and Agency-wide integrators	- LCC for agencywide efforts	- Not readily available
	- Affordability of agencywide efforts	- Not determined explicitly
	- Independent cost estimating	- Resource-limited capability (Comptroller)
	- Quality assurance	- Resource-limited capability (Comptroller)

but much of the data in the manual are out of date. Command centers, intelligence systems, and sensors are not covered. Some capability exists to estimate costs for advanced technology systems. Affordability assessments of C^3 element capability objectives are not currently conducted.

System Engineers

LCC estimating and analysis capabilities for program definition support are not readily available in-house. Contractor support is used to prepare program data bases for the development of program plans, but affordability assessments of program alternatives are not conducted.

Program Managers

The capability to provide LCC support to PMs is not readily available in-house. In the absence of such support, the PMs rely to a large extent on the unreviewed cost information developed by the contractor responsible for producing and/or leasing communications systems or equipment. No explicit determination of program affordability is made.

Corporate Management and Agencywide Integrators

LCC capability for agencywide efforts is not readily available at DCA. Since the program review process does not require a baseline estimate of LCC, changes in program costs cannot be tracked. Independent cost estimates (ICEs) or quality assurance (QA) reviews of program manager LCC estimates are not required. As a result, the capability to do them has not been developed. Affordability considerations relevant to agencywide efforts are not explicitly considered.

3. LONG-TERM CAPABILITY OBJECTIVES AND TRANSITION STRATEGY

This chapter provides a summary of DCA's long-term capability objectives (LTCOs) for LCC analysis. It also provides a transition strategy for developing these capabilities.

The transition to advanced LCC estimating and analysis capabilities designed to satisfy the needs of DCA managers for LCC information takes advantage of efficiencies offered by automated, distributed LCC data bases and by models that are widely available and adaptable for use throughout DCA and the rest of the community. Readily available LCC capabilities developed by the Services and private industry will be used to the extent possible in the design of DCA's LCC estimating and analysis capability. The development of LCC capabilities will be responsive to, and integrated with, the developing mission-oriented management processes (e.g., program review) in the agency. This development effort will result in an advancement in the state of the art in LCC analysis across the entire C^3/I spectrum while building on the communications foundation.

Table 3-1 summarizes the ten LTCOs to be pursued by the four DCA user groups. The LTCOs are based on an analysis of agencywide needs for LCC estimating and analysis capability for support of the mission-oriented acquisition planning process. Cost analysis capability will reside both in the CEAD and in user groups. The CEAD will be responsible for quality assurance, the development of ICEs, the acquisition and maintenance of general-purpose cost data bases, the development of cost factors and models that service several user groups, the conduct of special studies and analyses as required by corporate-level management, and the conduct of cost analysis training

TABLE 3-1. LCC CAPABILITIES OBJECTIVES BY USER GROUP

LCC CAPABILITIES OBJECTIVES	USER GROUP RELEVANCE			
	ARCHITECTS	SYSTEM ENGINEERS	PROGRAM MANAGERS	CORPORATE MANAGEMENT/ AGENCYWIDE INTEGRATORS
1. Advanced Technology System Cost Estimating	X	X	X	
2. Independent Cost Estimating				X
3. Quality Assurance Cost Reviews				X
4. Economic Analyses	X	X	X	X
Funding Requirements Estimating				
5. - Extended Planning (15 years)	X			
6. - Five-Year Planning/ Programming		X	X	
7. - One-Year Planning			X	
8. Acquisition Management Support Estimating, Cost/Schedule/Performance Trade-Offs, Level of Repair Analyses, Design to Cost, Reliability Improvement Warranties, Manpower Requirements, Training, Value Engineering, Logistics Support Analyses, etc.			X	
9. Program Cost Tracking			X	X
10. Special Studies and Analyses				X

activities. Architects, SEs, and PMs will develop LCC information to satisfy their own needs, drawing on the general-purpose capabilities available from the CEAD as appropriate. These user groups will also make program data bases, advanced system cost estimates, and other LCC data they have been developing available for quality assurance review by the CEAD and possible inclusion in the agency LCC data base.

Table 3-2 summarizes the key elements of the transition strategy.

LCC LONG-TERM CAPABILITY OBJECTIVES

Ten LCC capability objectives are listed in Table 3-2. Those in the communications area will be developed first, followed by those for ADP and command centers, and then by any required for sensors and intelligence. The initial operating capability (IOC) dates for an enhanced automated capability in these areas are FY 1987, FY 1989, and FY 1991, respectively. Full operational capabilities would be achieved after about two years of system development work in each area.

Some of the development work accomplished in the communications area will also contribute to capabilities development for ADP, command centers, sensors, and intelligence systems. Computerized models for making 15-year forecasts of funding requirements, performing economic analyses, or analyzing risk and uncertainty are examples of capabilities applicable to all areas. However, since the cost data base requirements and the "cost drivers" used in cost-estimating models are unique to each area, separate development efforts are needed.

Estimates of advanced systems costs are required in order to evaluate, plan, program, and budget for new systems. A second estimate of costs, independent of the PM's estimate, should be made before major commitments of Government funds are made to a program. OSD requires that formal ICEs be made

TABLE 3-2. SUMMARY TRANSITION STRATEGY FOR LCC CAPABILITY DEVELOPMENT

	COMMUNICATIONS	ADP & COMMAND CENTERS	SENSORS & INTELLIGENCE
LCC Capability Objectives by Fiscal Year (FY)[a]			
1. Advanced System Cost Estimating (Architects,SEs,PMs)	FY87	FY89	FY91
2. Independent Cost Estimating (Corporate Management)	FY87	FY89	NA
3. Quality Assurance (Corporate Management)	FY87	FY87	NA
4. Economic Analyses (All)	FY87	FY89	FY91
5. Extended Planning (Architects)	FY87	FY89	FY91
6. Five-Year Planning/Programming (SEs, PMs)	FY87	FY89	NA
7. One-Year Planning (PMs)	FY87	FY89	NA
8. Acquisition Management Analyses (PMs)	FY87	FY89	NA
9. Program Cost Tracking (PMs, Corporate Management)	FY87	FY89	NA
10. Special Studies (Corporate Management)	FY87	FY87	NA
Requirements Characteristics Near-Term - Implement LTCOs Based on DCA Mission Priorities (e.g., DSN, NWEAMP) Mid-Term - Transition to Integrated LCC Capability Long-Term - Fully Automate and Distribute LCC Models and and Data Bases to All Users	- Automated/Distributed LCC Models and Data Bases - User-Friendly/Interactive System Design - End-Item LCC Models and Aggregator Models - Support Current Programs (DDN/DSN/MEECN) - Defined Interface Between LCC Model Outputs and Program/Budget Inputs - Priority Development of Technology-Sensitive Advanced System Cost Estimating Capabilities		
Cost Envelope (regarding implementation of LCC Management Master Plan) Program Objectives Memorandum Years Extended Planning Affordability	- Initial Additional Funding for Staff and Acquisition of LCC Models and Data Bases - As LCC Models and Data Bases Mature, Funding Requirement Declines - Difficult in Near-Term. Affordable in Out Years. Near-Term Resources Allocated from Mission Activities.		
Technology Evolution Assumptions	- DCA Management Processes Will Mature - Technological Advance in C^3/I Systems Will Be Rapid - Service/Industry Data Bases and Models Are Mature - DCA Has Substantial Internal ADP Capabilities		
Functional Capabilities	- Updated and Expanded Cost and Planning Factors Manual - Advanced System Cost Estimating Model - Economic Evaluation Algorithm (e.g., DCA Model - Currently Not in Use) - Long-Term Funding Requirements Forecaster (e.g., DCEC Model)		
Relevant Programs	- Cost and Planning Factors Manual Update and Expansion - Cost Estimating Relationship (CER) Development Program - DCA Cost Model Development - Long-Term Funding Requirements Forecaster - Service/Industry Model Adaptations - Tri-Service Coordination Wherever Feasible		

[a]The fiscal year shown is the planned IOC date of an enhanced automated capability. The various LCC capabilities would be subject to continuous evolutionary development.

on major systems; however, similar principles apply to less-than-major systems. Independent Government estimates are also developed as part of the Government contracting process. Corporate management is responsible for ensuring the quality of LCC estimates and analyses used in the Agency. Corporate management may also require special studies and analyses involving major program reviews or other issues, such as effects of deregulation on DoD communications costs. Cost-benefit studies or economic analyses of alternative C^3/I systems, support systems, programs, concepts, and strategies constitute an on-going management discipline. Planning, programming, and budgeting covering the long-, mid-, and near-term planning horizons require that funding needs associated with various architectures, systems, or networks be estimated and an affordability determination be made. Acquisition PMs must conduct many detailed trade-off analyses involving cost/performance/schedule and logistics support for their systems. For program review purposes, a baseline system must be defined, the LCC of the baseline system must be estimated, and provision must be made for any changes to the baseline estimate to be tracked and justified in each program review as the system evolves in the acquisition process.

REQUIREMENTS CHARACTERISTICS

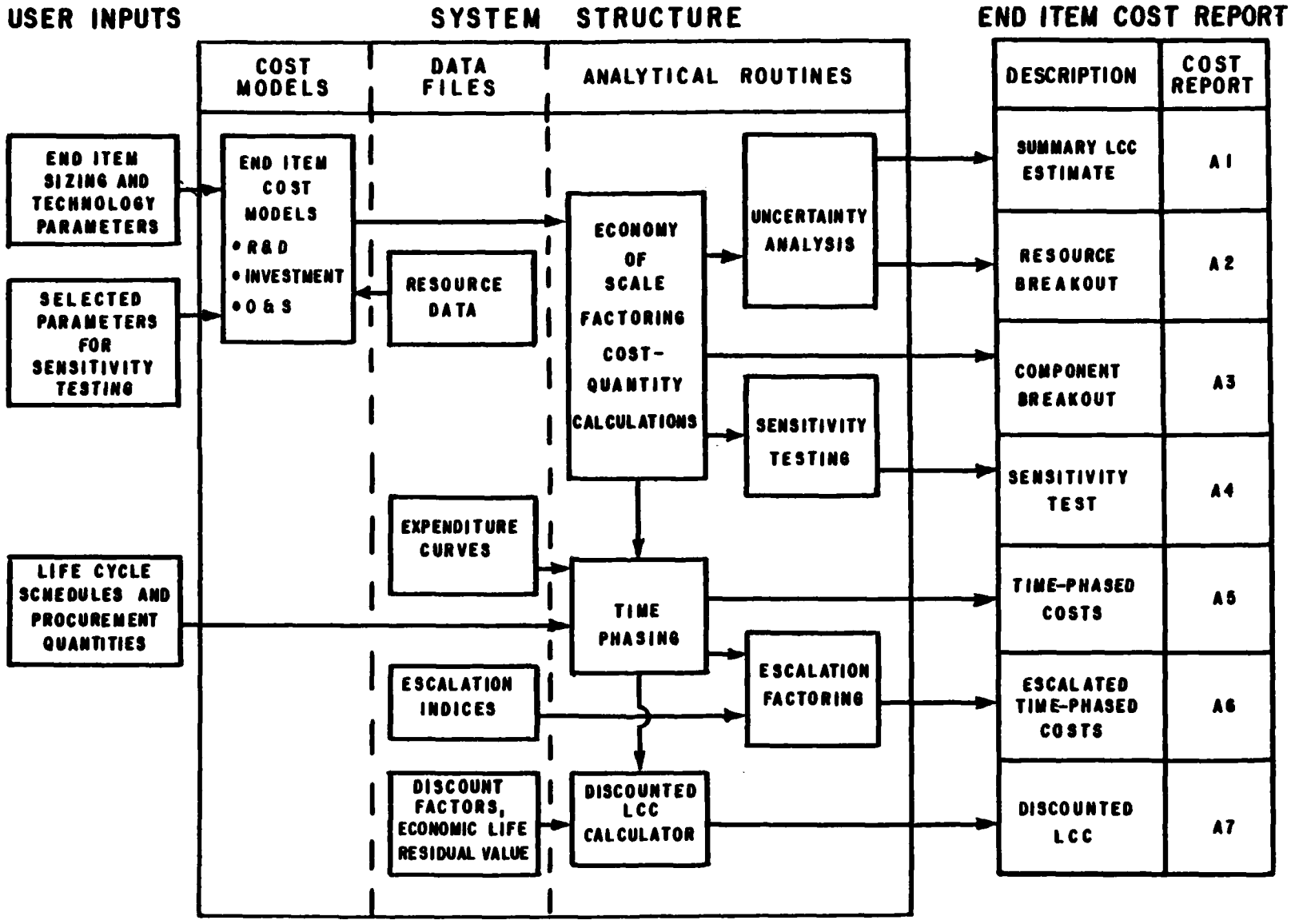
All existing LCC data bases, methods, and applications areas need improvement, while many need original work (see Table 2-1). The development of specific capabilities will be time-phased to coincide with major agency needs for LCC estimates and analyses. Two current efforts requiring LCC work are the DDN and Defense Switched Network (DSN) acquisition programs and the next update of the MEECN Master Plan. Development of specific LCC capabilities needed in these areas would yield immediate payoffs.

Two types of models are needed for most cost estimating and analysis applications: (1) an end-item LCC model and (2) an aggregator model summing the annual funding requirements of several end items (or C^3 systems) to a program, major system, network, or architectural level. Figure 3-1 shows the structure of LCC system processing for analysis of C^3/I end items. The figure shows the user inputs, system structure (cost models, data files, and analytical routines), and end-item cost reports that, when taken together, yield the LCC information needed for almost all applications. The summation of time-phased costs for all of the end items in an architecture or program (e.g., a communications network) yields the total funding information needed as an input in the affordability assessment process. This summation can be readily provided by state-of-the-art aggregator models such as the mission-area planning tool developed by a contractor for the strategic mission area architect (I300).

The development of LCC capabilities will also have the following characteristics:

- LCC models and data bases will be automated to the extent appropriate and distributed to relevant users in DCA.
- LCC models will be simple and clear, support documentation of results, produce a variety of reports, and have a list of cost elements (work breakdown structure) that can be easily tailored to typical DCA user requirements; their use will require minimal training.
- LCC models will produce the output information needed to support evolving management processes in DCA, such as the program review process and the affordability assessment process.
- The interface between program data bases and LCC models will be defined to permit assessment of programmatic impacts of alternative architectures, programs, or systems.
- Advanced system cost estimating, a high-priority LCC capability objective, will incorporate sensitivity and risk analysis.

FIGURE 3-1. LIFE CYCLE COST SYSTEM PROCESSING FOR END-ITEM ANALYSIS



COST ENVELOPE

Initial additional funding will be required for development of cost data bases, methods, and models, and for pilot applications development of other applications areas. In the extended planning horizon, funding requirements will level off and decline slightly as the LCC processes become more highly developed. The near-term affordability of the LCC capability improvement initiative appears problematic since DCA Headquarters mission-support funds are scarce. This problem must be corrected in the longer term to permit development of the much-needed enhancements.

TECHNOLOGY EVOLUTION ASSUMPTIONS

Two key technology evolution assumptions underlie the LCC master plan. One is that C^3/I technology and infrastructure (e.g., deregulation) will continue to advance rapidly, resulting in marked economic and performance impacts. The other is that management processes in DCA will mature, resulting in the placement of increased emphasis on LCC considerations in planning, programming, budgeting, and program management activities (including system acquisition and supportability) within DCA. Management use of program reviews, independent estimates of LCC, and tracking of program costs will be required to achieve better cost control. LCC estimates and analyses will be needed to support cost-benefit analyses and affordability assessments to be incorporated in the acquisition planning system. Enhanced LCC estimating and analysis capabilities are essential inputs to a mature DCA management process.

Initially, the DCA development effort in the LCC area will rely on existing Service and industry data bases, and some DCA modeling effort will be required to tailor them for DCA applications. DCA currently has substantial ADP capacities that can be used to achieve the desired automated and distributed LCC capabilities needed. Where Service or commercial models are

relevant to the LCC problem at hand, DCA has the user devices necessary to effect a tie-in.

FUNCTIONAL CAPABILITIES

Exemplary functional capabilities to be developed include an updated and expanded Cost and Planning Factors Manual, advanced system cost estimating methods and models sensitive to C^3/I system technology change factors, an economic evaluation subroutine for calculating present values such as the one planned for the DCA cost model, and a long-term funding forecasting model similar to the one developed at DCEC for a long-term planning study of the DCS.[1]

RELEVANT PROGRAMS

Specific LCC development programs designed to achieve capability objectives include the updating and expansion of the Cost and Planning Factors Manual; a cost estimating relationship (CER) development program covering communications systems, command centers, and ADP, and sensors and intelligence systems (in that order); the reactivation of a DCA cost model development effort; the development or adaptation of a long-term funding requirement forecasting model; and a program to evaluate and select existing Service or industry models for adaptation to DCA uses and users.

Each of these programs requires some data base development work, and each will evolve into a fully automated capability, easily accessible to widely distributed users, covering communications, ADP, command centers, sensors, and intelligence systems.

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[1]Additional LCC models of potential relevance to DCA applications are described in LMI Working Note DC301-3, which provides a preliminary functional description of required DCA LCC modeling capability. Included there are preliminary specifications for a long-term planning model for mission and functional architects, a cost-estimating relationship (CER) model, and three currently operating models for providing acquisition support analysis.

4. TRANSITION PLAN

The transition to enhanced LCC estimating and analysis capabilities in DCA will be based on the acquisition of cost data bases, methods, and models tailored to meet the needs of DCA user groups. The transition plan calls for conducting four pilot projects representing typical problems encountered by architects, SEs, PMs, and corporate management/agencywide integrators. In addition to satisfying an existing DCA need for cost analysis support, the lessons learned from these projects will form the basis for defining specific programs for acquiring LCC analysis capabilities. A better estimate of resources needed in the out years for LCC development programs would be made. This transition plan defines the LCC improvement program over the next two years and outlines the continuing LCC development effort.

ALTERNATIVES

There are three generic alternatives for acquiring LCC capabilities:

- Develop new data bases, methods, and models.
- Adapt existing Service or industry data bases, methods, and models.
- Contract for cost-estimating and analysis services.

Development of new capabilities is costly and time-consuming but is likely to result in capabilities tailored to meet DCA needs and a much-needed advancement in the state of the art of cost analysis in the C^3/I and ADP areas. The second alternative, adaptation of existing data bases, methods, and models, yields capabilities quickly and at nominal cost but requires an aggressive effort to tailor these products to meet specific DCA user needs. The third alternative, contracting for cost estimating and analysis services, since it places reliance on contractor support, develops no in-house capability. While

professional cost analysis services may be acquired quickly from the most competent contractors, this last approach inevitably leads to some duplication of effort and requires substantial monitoring by a DCA staff trained in cost analysis; such a staff is not currently available because of limited resources.

KEY SUBSYSTEMS

The key subsystems of an estimating and analysis capability are shown in Figure 3-1. In addition to those key subsystems, a richly detailed historical cost data base covering primarily the acquisition, operation, and support of C^3/I and ADP equipment end items is needed. Figure 3-1 shows generic subsystems such as cost models, sensitivity, uncertainty, escalation, and discounting routines and inputs and outputs typically used in cost analyses. As a rule, different sets of generic subsystems will be needed to cover communications, ADP, command centers, intelligence, and sensors and to satisfy the widely varying needs of architects, SEs, PMs, and corporate managers/ agencywide integrators.

The process for acquiring LCC capabilities begins with conducting several pilot projects in which existing Service/industry data bases, methods, and models are evaluated and used to satisfy the real needs of architects (e.g., NWEAMP), SEs (e.g., MEECN), PMs (e.g., DSN), and corporate management/ agencywide integrators (e.g., an ICE for DSN). The results of these projects will provide the basis for a refined LCC program definition and an LCC master plan revision containing specific programs for acquiring LCC capabilities. The pilot project evaluations will focus on identifying existing Service/ industry capabilities that can profitably be adapted to agency use in the near term. A revised long-term plan for acquiring capabilities currently not available anywhere will also be developed. The pilot projects will also

benefit the systems and programs selected. A baseline cost estimate, for example, adds credibility outside of DCA and aids in program justification.

Subsequent to the completion of the pilot projects, one or more revised DCA instructions will be developed to fully incorporate LCC considerations in DCA management processes. Such an instruction will include policies, procedures, and responsibilities not only for economic analysis and program evaluation for resource management but for other LCC management objectives as well (e.g., quality control, affordability assessment, and acquisition).

CAPABILITY OBJECTIVES

It is anticipated that with implementation of the LCC master plan all the capability objectives listed in Table 3-2 can be achieved by the fiscal years indicated. However, advanced system cost estimating and independent cost estimating represent capabilities that are difficult to obtain in an environment of rapidly changing technology. These capabilities, therefore, involve a higher degree of risk than the others.

COST AND SCHEDULE

Figure 4-1 shows the master plan schedule for conducting pilot projects, and development programs and for continuing LCC applications by the four user groups. The pilot projects to be conducted in FY 1984 and FY 1985 serve three purposes: they provide needed LCC estimates and analyses, they evaluate existing Service/industry data bases and models for potential application to DCA problems, and they provide an experience base for refining LCC development program definitions on the basis of real user requirements. The programs for developing LCC capabilities focus on the communications programs and systems in the near term, leading to an IOC of enhanced LCC estimating and analysis capabilities for communications in FY 1987, followed by ADP and command centers in FY 1989, and by sensors and intelligence systems in FY 1991. The

relationship between the development programs and LCC capability objectives is shown in Table 4-1 and is discussed briefly below.

FIGURE 4-1. DCA LIFE CYCLE COST MANAGEMENT MASTER PLAN SCHEDULE

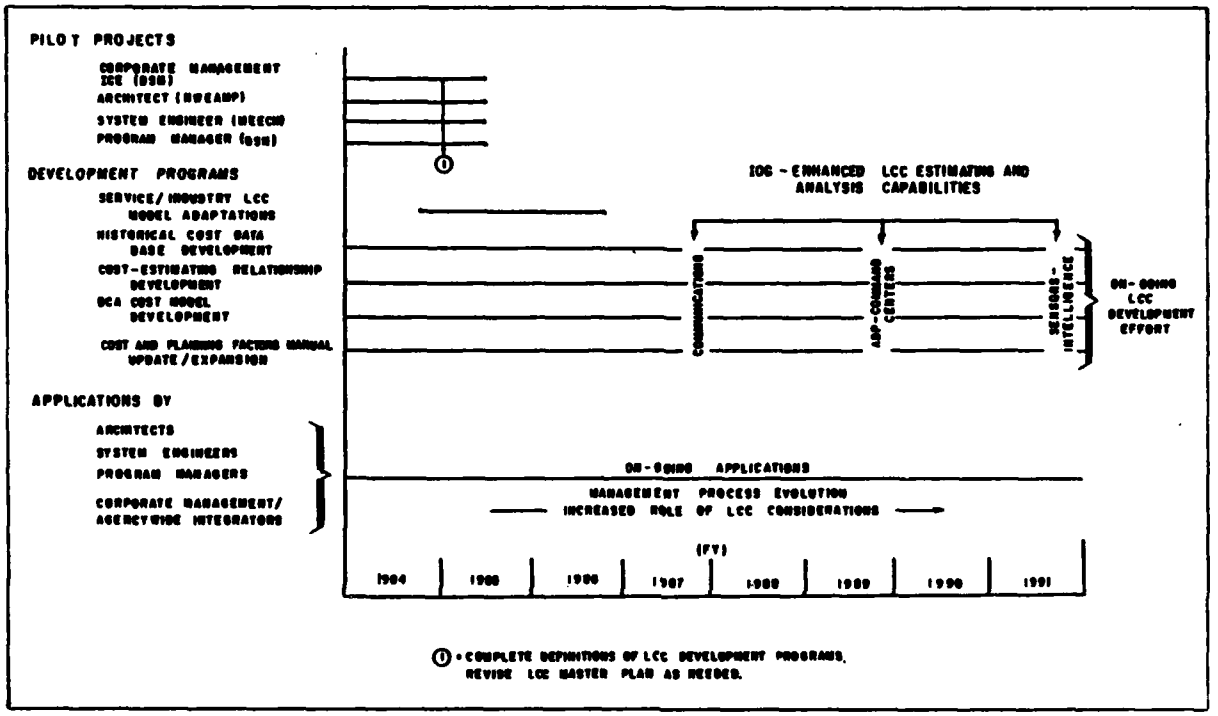

TABLE 4-1. CAPABILITY OBJECTIVES SERVED BY LCC DEVELOPMENT PROGRAMS

DEVELOPMENT PROGRAMS	PRINCIPAL CAPABILITY OBJECTIVES (See Table 3-2)
Service Industry LCC Model Adaptations	1, 4, 6, 7, 8, 10
Historical Cost Data Base Development	1, 2, 3
CER Development	1, 2
DCA Cost Model Development	4, 5, 6, 7, 8, 10
Cost & Planning Factors Update/Expansion	All

Five development programs have been defined: (1) Service/industry LCC model adaptations, (2) historical cost data base development, (3) CER development, (4) DCA cost model development, and (5) Cost and Planning Factors Manual update/expansion. Existing Service/industry LCC models have capabilities to do advanced system cost estimating, economic analyses, planning and acquisition management optimization, and trade-off analyses. These existing capabilities need to be evaluated for potential relevance to DCA problems. Historical cost data provide the foundation for advanced system cost estimating, ICE, and quality assurance reviews that check the reasonableness of cost estimates in light of prior cost experience. CERs are usually statistically derived from an historical cost data base and used for making advanced system cost estimates or independent estimates. DCA cost models are needed for economic analysis planning and special studies. A Cost and Planning Factors Manual contributes to all capability objectives by making general-purpose cost factors and cost analysis policies and procedures available throughout the agency in a single volume.

Planning estimates of the resources required to support the master plan are shown in Table 4-2. These estimates are based on a review of (1) DCA internal activities, including the DCA Comptroller and the MEECN SE and strategic architect, and (2) the cost resources used by the Service cost organizations for cost estimating and analysis services. The development effort requires between 11 and 14 staff-years per year at an estimated cost of $1.0 to $1.5 million a year. Because of resource limitations, the CEAD is currently spending only about one staff-year annually in this area. The master plan would require the addition of 10 staff-years per year to LCC capabilities development efforts, primarily in the area of historical data base development, the foundation for LCC estimating and analysis capabilities.

TABLE 4-2. MASTER PLAN RESOURCE REQUIREMENTS
(IN STAFF-YEARS)

MASTER PLAN AREA	FY84	FY85	FY86	FY87	FY88, 89, AND LATER
1. Pilot Projects					
Corporate Management ICE (DSN)	2	1			
Architect (NWEAMP)	2	1			
System Engineer (MEECN)	2	1			
Program Manager (DSN)	2	1			
2. Development Programs					
Service/Industry LCC Model Adaptations		2	2		
Historical Cost Data Base Development	2	4	6	6	6
CER Development		1	2	2	2
DCA Cost Model Development	1	2	2	2	2
Cost & Planning Factors Manual Update/Expansion	1	1	1	1	1
3. Subtotal Development Effort[a] (1. + 2.)	12	14	13	11	11
4. Applications by					
Architects[b]	12	12	12	12	12
System Engineers (SEs)[b]	30	30	30	30	30
Program Management[b]	10	10	10	10	10
Corporate Management/Agencywide Integrators	10	10	10	10	10
TOTAL (3. + 4.)[c]	74	76	75	73	73

[a]Cost for the LCC development program is estimated at $1.0 to $1.5 million a year.

[b]Staff-years currently dedicated to the LCC effort, including program data base development, have not been surveyed. The planning estimates shown are for staff-year requirements and are based on the following planning factors:

Architects: Two staff-years each for strategic, tactical/theater, and Defense-wide communications and command centers/ADP.

SEs: Two staff-years for each of 15 applications (see Table 4-3).

PMs: Two staff-years for each of five PMs or about one staff-year per $50 million of annual procurement activity.

[c]Current DCA baseline resources are estimated at 60 staff-years, much of which is under contract.

TABLE 4-3. SYSTEM ENGINEERING PROGRAM DEFINITION APPLICATIONS

MISSION	NUMBER OF PROGRAM APPLICATIONS				
	COMMUNICATIONS	COMMAND CENTERS	ADP[a]	SENSORS[b]	INTELLIGENCE[b]
Strategic	2	2	1	As Required	
Tactical/Theater	2	2	1	As Required	
Defense-Wide	2	2	1	As Required	

[a]ADP LCC applications will focus on long-term transition strategy LCC in conjunction with the Worldwide Military Command and Control System (WWMCCS) Information System Joint Program Manager (WIS JPM).

[b]Intelligence and sensors LCC applications will monitor and participate in program definition LCC in conjunction with other agencies (e.g., Defense Intelligence Agency, National Security Agency, etc.).

Although an exhaustive survey of the resources required or used in current agencywide applications has not been made, a pl. . ng estimate of requirements of about 60 staff-years is projected. This is not all new effort since much of the 60 staff-years is currently contracted for throughout the agency. In one case, the MEECN SE formerly used two staff-years per year to develop funding information for the MEECN master plan but currently uses none. The CEAD currently uses four or five staff-years each year in support of corporate management/agencywide integration for LCC training, quality control reviews of cost estimates and analyses, special studies, and other applications. An estimated 10 staff-years is needed annually to service all corporate-level applications.

The single largest resource requirement shown -- 30 staff-years per year -- is for program definition by SEs. SE LCC resources are required for communications, command centers, and ADP in each of the three mission areas

(i.e., strategic, tactical/theater, and Defense-wide). Table 4-3 displays the number of system engineering program definition applications requiring LCC estimating and analysis support within DCA.

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GLOSSARY OF ACRONYMS

ADP	Automatic Data Processing
C^3	Command, Control, and Communications
C^3/I	Command, Control, and Communications/Intelligence
CCEC	Command and Control Engineering Center
C^2FYSP	Command and Control Five-Year Summary Plan
CEAD	Cost and Economic Analysis Division
CER	Cost Estimating Relationship
DCA	Defense Communications Agency
DCEC	Defense Communications Engineering Center
DCS	Defense Communications System
DCSO	Defense Communications System Organization
DDN	Defense Data Network
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
DSN	Defense Switched Network
FAR	Federal Acquisition Regulation
FY	Fiscal Year
FYDP	Five-Year Defense Program
FYP	Five-Year Program
GWEN	Ground Wave Emergency Network
ICE	Independent Cost Estimates
IOC	Initial Operating Capability
JCS	Joint Chiefs of Staff
JDSSC	Joint Data Systems Support Center

LCC	Life Cycle Cost
LTCO	Long-Term Capability Objective
MEECN	Minimum Essential Emergency Communications Network
NWEAMP	Nuclear Weapons Employment and Acquisition Master Plan
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
PM	Program Manager
PPBS	Planning, Programming, and Budgeting System
PSI	Planning and Systems Integration
QA	Quality Assurance
RDT&E	Research, Development, Test, and Engineering
SE	System Engineer
WIS JPM	WWMCCS Information System Joint Program Manager
WWMCCS	Worldwide Military Command and Control System

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Defense Communications Agency (DCA) has evolved from functioning simply as primary manager and operator of the Defense Communications System to providing command, control, and communications (C^3) mission analysis, long-term planning, and systems engineering and integration support at the National, Office of Secretary of Defense, Joint Chiefs of Staff, and Unified and Specified Command levels. To accommodate its enhanced role, DCA has identified a need to upgrade its life cycle cost (LCC) estimating and analysis capabilities (Continued)

20. (Continued)

consistent with new DoD acquisition policy in an environment of rapidly changing C^3 technology and deregulation of the communications industry. DCA tasked LMI to prepare a master plan for developing LCC capabilities, including advanced-system cost estimating, independent cost estimating, LCC quality assurance, comparative economic analysis, acquisition management analysis, program cost tracking, special studies, and funding requirements forecasting for planning, programming, and budgeting.

The recommended plan calls for conducting pilot projects and development programs. These projects would result in assessing the usefulness of current DCA, Military Service, and commercial LCC models and data bases. Development programs would be defined and executed for adapting those models and data bases found useful and developing new ones if they are needed. The cost for developing these LCC capabilities is modest in relation to the benefits to be realized from the results: selection of cost-effective system and system-support options, improved cost control, and affordable C^3 systems.

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